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96. **Proposed by B. F. FINKEL, A. M., M. Sc., Professor of Mathematics and Physics in Drury College, Springfield, Mo.**

A random straight line is drawn across a square; find the chance that it intersects two opposite sides. [From *Byerly's Integral Calculus*, page 209].

⁂ Solutions of these problems should be sent to B. F. Finkel not later than June 10.

MECHANICS.

107. **Proposed by M. E. GRABER, Student, Heidelberg University, Tiffin, O.**

Two particles attracting each other inversely as the square of their distance apart, are constrained to move in straight lines which intersect each other at right angles. How long will it take for the particles to meet and how far does each particle *move ?*

108. **Proposed by F. P. MATZ, M. Sc., Ph. D., Professor of Mathematics and Astronomy in Irving College, Mechanicsburg, Pa.**

Can it be shown, as a result of Kepler's third law, that the distances are inversely proportional to the squares of the velocities ?

⁂ Solutions of these problems should be sent to B. F. Finkel not later than June 10.

BOOKS AND PERIODICALS.

The Teaching of Elementary Mathematics. By David Eugene Smith, Principal of the State Normal School at Brockport, New York. 8vo. Cloth, xv+312 pages. Price, $1.00. New York : The Macmillan Company.

In this book may be found the answer to such questions as these: Whence came the subject of mathematics? Why am I teaching it? How has it been taught? What should I read to prepare for my work? Any book which answers these questions to the entire satisfaction of the teacher and the student is worthy of a high place in the category of educational works. One will find in this work an excellent treatment of the various methods of teaching arithmetic,algebra, and geometry, and in this respect it is of inestimable value to all teachers of elementary mathematics.

Not only is this book of great value to teachers of mathematics, but to all those who have under their direction the formulation of courses of study. It is to be hoped that this work will help to dispel that insane notion yet quite prevalent even among professed educators that mathematics has only utilitarian value, that only so much of it ought to be studied as will be used in the general affiairs of life. Yet these very same educators see no incongruity in spending five or six years in the study of Greek, or Sanskrit, or Hebrew, or Archeology, even though the student expected to study medicine. It is admitted that a large part of practical arithmetic is not generally applicable to ordinary.business, and hence is quite impractical, yet it by no means follows that it may not serve a valuable purpose. "Hamlet may bring us neither food nor clothing, and yet a knowledge of Shakespeare is valuable to every one. It is a matter of no moment in the business affiairs of most men that they know where the Caucasus Mountains are, or which way the Rhine flows, or who Cromwell was, and yet we cannot afford to be ignorant of these facts." This is the proper view. Mathematics should be studied and cultivated for its own sake; for the culture and discipline it gives the mind; for the ethical effect its study produces on the mind of man. Since mathematics is becoming more and more the means by which the phenomena of nature are interpreted, the time is not far distant when one who is ignorant of the principles and processes of the differential and integral calculus will be ignorant of all the advances yet to be made in the fields of natural sciences. Lord Kelvin says that the phenomena of nature are the asymptotes towards which mathematics may approach as near as we please. B. F. F.

Plane and Solid Geometry—Revised Edition. By G. A. Wentworth, Author of a Series of Text-Books in Mathematics. 12mo. Half morocco, 386 pages. Price, $1.25. Boston: Ginn & Company. 1899.

This book has stood the supreme test—successful classroom use, and is recognized as one of the very best works published. In the revised edition the author has retained all the strong points and has added some new ones. The printed page is exceedingly attractive. Full, long-dashed, and short-dashed lines of the figures indicate given, resulting, and auxiliary lines, respectively. Bold-faced, italic, and roman type has been skilfully used to distinguish the hypothesis, the conclusion to be proved, and the proof. The reason for each step is now indicated in small type between that step and the one following, thus avoiding the necessity of interrupting the logical train of thought.by turning to a previous section. This help is gradually disgarded as the pupil gains more skill and becomes acquainted with a greater number of geometrical truths. The demonstrations are very clear, and the exercises abundant and interesting. J. M. C.

Algebra for Schools. By George W. Evans, instructor in Mathematics in the English High School, Boston. 427 pages. Price, $1.12. New York: Henry Holt & Company. 1899.

We note in this book with favor the careful classification of problems, and the emphasis given to the several types of equations arising from them; the scheduled explanation of steps in the reduction of equations; the thorough study of literal equations and generalized problems; the application of factoring to the solution of equations; the separation of Elimination into two parts suitable for linear systems and for linear-quadratic pairs respectively; and the great number of graded examples and problems—some 3500 in all—many of which are new. There is some lack of accuracy of statement. "Algebra is a method of abbreviating the explanations of problems in arithmetic. It is also used to abbreviate the statement of rules and the demonstration of theorems." "If equal qualities are multiplied or divided by the same *amount*, they remain equal." He speaks of "nests" of parentheses. We regard the treatment of negative quantities as especially defective and unscientific. In other respects the work is unusually good in arrangement, material, and method of presentation. J. M. C.

Infallible Logic. A visible and automatic system of reasoning. By Thomas D. Hawley, of the Dominion Company, Chicago. 1897.

To the readers of THE AMERICAN MATHEMATICAL MONTHLY the advances made in recent times in Logic are of interest, for they have brought it within the sphere of exact, if not of mathematical analysis. De Morgan started the movement with his *Formal Logic* and his *Memoirs on the Syllogism* and the *Logic of Relatives.* Boole advanced it greatly with his *Laws of Thought,* which he considered his best work; Jevons made a negative advance with his logical machine, and the same may be said of Venn with his *Symbolic Logic.* At the present time Prof. Peano and his colleagues in Italy are applying the Mathematical Logic to express in a concise and exact form all the fundamental definitions and theorems of mathematics. If a young mathematician wishes to become an investigator, he ought by all means to make himself acquainted with the works of the mathematical logicians.

As regards the above work "Infallable Logic," a young mathematician will not get any benefit out of it. It is put forth as a new system, and the author says that "probably the time is not far distant when it will take the place of the syllogistic and algebraic systems now in current use." It is both amusing and amazing to find that an author who puts forward such claims is ignorant alike of the old logic and of the most elementary mathematics. To prove the former point it is sufficient to mention that he says that the old logic derives by immediate inference from All S is P that Some P is not S; and that he does not see the truth of the fundamental principle of all syllogizing, namely that If all A is B and all B is C then all A is C. To prove the latter point it is sufficient to mention that he gives as an instance of a real proposition "the angles of any triangle are together equal to three angles," and in making an extract from Jevons he confounds differentiation with deduction and integration with induction.

His system is nothing but Jevons' method of writing down all the possible combinations of a number of qualities and their opposites, striking out the combinations which are negatived by the premises and taking what remains as the conclusion. Jevons wrote the combinations in columns on a "logical slate;" Hawley writes them in the form of a multiplication table, which he calls a Reasoning Frame.

Let us see what this invention of a Reasoning Frame can acomplish. Applied (by the author) to the propositions Washington is the capital of the United States.

Salt is chloride of sodium; it yields the following along with two other equally important conclusions:

Either Washington and the capital of the United States or neither is salt and chloride of sodium or neither.

He applies it to elucidate the fallacy "what you bought yesterday you eat today; you bought raw meat yesterday; therefore you eat raw meat today." He puts A=you, B=bought, C=what. D=yesterday E=eat, F=today, G=raw meat, and makes an $ABCDEFG$ table. The conclusion yielded by the Reasoning Frame is rather weak, if indeed, it means anything:

You eat or do not eat today or not today, raw meat. He fails to observe that the combinations he here makes are in no sense whatever the names or characters of one thing.

The Reasoning Frame strikes a snag in the numerically definite syllogism. He quotes the example "If 70 per cent of M are P and 60 per cent are S, then at least 30 per cent are both S and P; and adds "Of course this reasoning is correct, but I am unable to demonstrate its validity by the Reasoning Frame." As a matter of fact the simplest kind of logical diagram suffices. Let the square represent M. Take the most unfavorable case. Suppose that the M which are p are all to the left, and the M which are s are all to the right; there is then 30 per cent of overlapping, hence the M which is both p and s is at least 30 per cent. This principle is written algebraically.

$$sp > s \div p - 100$$

Also $sp < s$ and $< p$.

This single principle is worth more than all that is contained in the "Infallible Logic."

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